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THE PRESENT OBLIGATION OF THE ENTOMOLOGIST TO FORESTRY

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Problems of forest entomology comprise but one of the many phases of forestry with which the forester is confronted today. These problems are never considered from an academic view point but only as they relate towards the protection of our timber resources from the ravages of insects. Of the thousands of instances where insects are attacking and killing, or injuring forest trees and their products, the most important at this time are the depredations in our virgin pine forests by barkbeetles. The losses of timber from barkbeetle infestations vary from a few tenth of one percent to as much as one or two percent of the total volume of the stand per year. These infestations which vary in severity have become known as the endemic, often called normal, which exists in nearly all pine forests, and the epidemic, however the line of demarcation between these two is rather hard to draw.

For some time it has been thought by many that the forester's concern with barkbeetle epidemics would be at an end with the exhaustion of our virgin pine forests. This premise is based upon the theory that these beetles, which have always been considered as being primary killers, only attack those trees which are over mature with their resistance to

insect attack greatly lessened. This theory will no doubt prove to be correct with some species, but it seems hardly possible that all of these different insects which have been responsible for such a broad cast destruction of timber will be included. Furthermore, though it seems reasonably safe to assume so, we do not know if the resistance of these slow growing trees to insect attack has been lessened. Even though we accept the premise that Dendroctonus beetles only attack the over-mature and perhaps less resistant trees, the writer feels that it is rather difficult to foresee the future adaptations of these insects.

We know that at times many young thrifty pine trees are attacked by Dendroctonus beetles, in fact many vigorous pole stands have been seriously ravaged by these insects. Even though we assume that this is an abnormal habit at this time, can we be assured that these insects will not adapt themselves to the younger, more thrifty, commercial forests of the future. Some entomologists have gone so far as to say that from the history of European forestry we can see the future of our beetle problems, for there with the depletions of the virgin forests the depredations by tree killing barkbeetles came to an end. ^{3rd World War 1945} But it is wondered if the comparison of these totally different conditions is a fair one. Surely with our widely separated forest types and our greater number of destructive insects, Dendroctonus beetles alone at a ratio of 22 to 1, these conditions could hardly be called parallel.

In this connection let us consider the southern pine beetle (Dendroctonus frontalis). In many regions throughout the Gulf states the

mature timber was exhausted years ago, and still there are severe epidemics of this insect occurring from time to time. If this should prove to be the proverbial exception to the rule, then well and good. However if it is but an example of what is to occur in our future pine forests, then indeed our barkbeetle problems are but starting, for it seem at this time that the thoughts of controlling the sporadic outbreaks of this beetle are practically hopeless. But as it is difficult to forsee the future of these insects, it would seem rather hazardous to attempt a prediction in answer to this question. It is very true that all investigative programs must look into the future as far as possible, and what is there seen will largely govern the lines of research selected. However in determining this future need one must exercise great care so that the immediate demands of forestry will not be overlooked.

Though we may speculate as to the barkbeetle problems in our forests of the future, time alone will answer our question. However it is hoped that sufficient forwarning of this answer will be given so that the solution can be adopted to the practice of forestry. Regardless of this issue the obligation of the entomologist to forestry at the present time will remain unchanged. An investigative program should be broad enough, so that if possible the problems which lie ahead of the present needs can be solved before they are reached. However the immediate obligation which forestry has placed upon the entomologist today, is the protection of our mature pine forests from insect depredations. And it is with this obligation in mind that the Bureau of Entomology is

centering their activity towards the improvement of their methods of bark-beetle control which are now in use.

For years the demands which have been made upon the artificial measures employed in barkbeetle control work have been unjust. Control measures instituted against an outbreak of these insects have been expected to give permanent relief from future losses. No other injurious insect pest is, or will ever be, controlled in this manner. The horticulturist by spraying eliminates practically all the insect damage to his orchard for that season, but he is required to repeat the operation the following year. And ^{so} as it will prove to be with the control of any injurious insect unless by some miracle all of the individuals of that species are destroyed.

Should not the prevention of insect depredations within our forests be considered as a form of forest protection? Suppression of all fires within a forest for one, two, or even ten years will give no assurance that none will occur the following season. And yet the protection of our forests from fire is not given up as hopeless. Permanent relief has always been expected of barkbeetle control work, a result which would only be possible if all of the destructive insects were destroyed. As this will perhaps never be accomplished, there can be no adequate reason given why under favorable conditions there will not be a recurrence of the outbreak.

With the placing of insect control projects in the light of forest protection, as they should be, then there is a problem to determine when

such operations on an equal plane with fire suppression are justifiable. Forest insect control divides itself into two phases which are yearly maintenance work against the endemic, or normal infestation for the purpose of still further reducing the annual loss and preventing epidemics, and the reduction of epidemics to a normal status.

There are many factors which enter into the justification for bark-beetle control. As an epidemic condition is somewhat spectacular it is much easier to awake public sentiment in order to secure funds for its control than it is for the endemic, or normal infestation. However the results obtained from the control of epidemic infestations are perhaps more difficult to determine than for an endemic condition. As yet so little is known concerning the reason for the increase or decrease of these epidemics, that control measures are no doubt often instituted at a time when nature has already started to reduce the damage. In such cases unfair results would be credited to the control measures. On the other hand, if instituted when the infestation was increasing, there might still be an increase of damage which would result in the work being considered a failure, when no doubt the timber losses were materially reduced. Relative to the institution of control measures for epidemics the most difficult problem which confronts the entomologist is determining the status of the infestation, and its future if no work is inaugurated. So when dealing with epidemics, it becomes not so much a question of securing funds for the work as of justifying the institution of the operation and the determination of the results obtained.

With endemic or normal infestation a different problem of justification is presented. At this time the only feasible methods of reducing an infestation of this character to a still lower point is by maintenance work from year to year. If the average annual loss from an infestation had been determined for the past three or four years, it would seem that any reduction below this point following the institution of the work could fairly be credited to the operation. On the other hand, if during the course of this maintenance work, a time came when there was an increase above this normal loss, the work would no doubt be considered a failure. However, this of itself would be unfair for it could be possible that due to the work a serious outbreak had been prevented.

In addition to the determination of the results the expense of the operation must be warranted. It would appear that the stumpage value of the timber at stake would answer this question. If the value of the timber saved balanced the expenditure the work would be economically justified, for no money would be lost, serious outbreaks perhaps prevented, and the life of our virgin forests prolonged. In determining the price of this stumpage it would seem that the expectation value of these trees at the time of their harvest should be considered. It seems hardly fair that timber, which will have a greatly increased stumpage price in the next ten years, should be allowed to die because at this time the cost of protection is a few cents more than its present value.

The forest entomologist is confronted with a multitude of problems which are yet to be undertaken. Leads towards economic problems, which

savor of interest, are constantly being developed which some day in the interests of forestry must be met and solved. However, with his duty clearly before him it becomes necessary to forsake these new, interesting phases of his work, and confine himself to a great extent to the protection of our mature timber from insect attack.

Certain methods of barkbeetle control have been developed by the Bureau of Entomology, which have afforded in most cases fair measures of success. Bureau Officers who have used these methods are not satisfied that they can not be improved, or perhaps disregarded entirely for some new plan. Outbreaks of barkbeetles in timber stands of high values have brought from the timber owners a pressure for the institution of control measures, as long as they offer a fair chance for relief. To meet these demands it often becomes necessary to recommend control measures, with which the forest entomologist is not entirely satisfied. They are the best which he has at hand and he applies them to the best of his knowledge.

If this phase of forestry or insect control, is to keep pace with the general practice of conservation, then the immediate task of the entomologist is the protection of our mature forest. He must strive to improve his present methods of control and determine means of applying them accurately and properly, so that satisfactory results will be obtained. But with the acceptance of this obligation, the entomologist asks that he be given an opportunity to make these studies, and that the impossible be no longer expected of control work. He will ask that control work be re-

garded as a phase of forest protection, perhaps gaining ^{ground} one year and losing a little the next, but over a period of years showing not only a saving of dollars, but a conservation of our national timber resources.

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